

## Digital Still Image Peripherals

This chapter presents the PC 99 requirements and recommendations for digital still image peripherals, including but not limited to digital cameras and scanning devices such as sheet-fed, flatbed, handheld, film, and fingerprint scanners.

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## Scanner and Digital Camera Overview

The integration of imaging devices on the Windows platform presents a wealth of business opportunities by transforming end-user computer interactions to those which are visually exciting and inherently more natural because of their visual nature. Contextual information can be conveyed as never before. As they say, a picture is worth a thousand words.

Changes in Windows 98 and Windows NT 5.0 address both consumer and business market segments with support for still image devices by providing broad, extensible operating system services. Imaging under the Windows platform will continue to grow to meet the challenging needs of the pre-press, publishing, and document imaging markets as well as the burgeoning consumer market by allowing for a range of possibilities from simple to complex.

For PC 99, new design issues relate to making the PC the premier imaging platform. To accomplish this, hardware vendors need to seamlessly integrate their devices with Windows. Issues include designing ways to:

- Initiate workflow for the user, such as incorporating push model support in all imaging peripherals.
- Reduce the complexity of working with imaging devices by using operating system services where available. This allows a consistent user interface and can simplify steps in image acquisition, processing, and output.
- Ensure consistent color from acquisition to output by working with Windows Integrated Color Management (ICM), providing for a positive end-user experience.

## Scanner and Digital Camera Basic Features

This section summarizes the basic PC 99 hardware requirements for scanners and digital cameras.

### **1. Device uses PC 99 compatible port connection**

*Required*

Recommended: USB or IEEE 1394 connection.

Although digital cameras are currently implementing a serial port interface for mainstream connectivity, the low bandwidth and slow throughput provided via the serial port is at odds with the bandwidth requirements of the emerging megapixel cameras. This creates a less than satisfactory user experience while transferring images to the PC.

PC 99 does not require a higher bandwidth interface such as USB or IEEE 1394, but recommends the use of one over a serial port implementation for megapixel

cameras. Future versions of this guide will require USB connectivity at a minimum. No proprietary solutions are acceptable for PC 99.

## **2. Icons provided for port and peripheral connectors**

### *Required*

To ensure proper connection by the user between cable and connector, an icon or text identifier must be added to any external connector, using vendor designs or the icons provided in the “Icons” appendix in the References part of this guide. The icon can be molded into or printed on the plastic (either by stamping or by affixing as a permanent sticker).

## **3. Device supports ICC color matching**

### *Required*

Windows and Windows NT support using color profiles that comply with the ICC Profile Format specification. All color output from still-image devices must be defined. The device either must create sRGB output or must embed the ICC profile for the newly acquired image into the image file to identify the color-space information for that image.

For contact information on device profiles, see the references at the end of this chapter. The ICM APIs and functionality for Windows and Windows NT are described in the Microsoft Platform SDK and the Windows NT 5.0 DDK.

For PC 99, color-capable devices such as desktop monitors, printers, scanners, still-image cameras, LCDs, color plasma displays, or other flat-panel devices are required to install one or more ICC profiles for ICM. Providing a monitor color-calibration utility is recommended for generating, editing, and installing ICC profiles. The sRGB profile will be distributed in Windows and Windows NT.

## **4. IR device meets PC 99 IR requirements**

### *Required*

For imaging devices that include an IR interface, all IR hardware must at minimum comply with the IR requirements defined in the “I/O Ports and Devices” chapter in Part 3 of this guide.

## **5. Digital camera with an IR interface uses Fast IR**

### *Required*

To improve the customer experience, the use of fast transfer mechanisms is advocated for digital cameras. It is recommended that every digital camera with an IR interface support Fast IR and include backward compatibility to Serial IR. This recommendation might become a requirement in future versions of this design guide.

## **6. Digital camera with an IR interface provides a secondary PC interface**

### *Required*

The availability of digital still image peripherals is expected to increase dramatically in the PC 99 timeframe. Although IR interfaces are increasingly

available in desktop systems and especially mobile PCs, many PCs do not include an IR interface.

To ensure that the widest variety of imaging devices become available for use with PC applications, it is required that devices with an IR interface also provide a secondary interface using a PC 98-compatible port connection such as USB or IEEE 1394. An IR camera that ships with an IR serial interface adapter complies with this requirement.

#### **7. SCSI device meets PC 99 SCSI requirements**

##### *Required*

All SCSI hardware must comply with the requirements defined in the “SCSI” chapter in Part 3 of this guide. This ensures complete Plug and Play capabilities with SCSI hardware. For example, a user must be able to attach any SCSI peripheral on a system with SCSI support. The operating system should automatically recognize it, load and initialize the appropriate drivers, and then make the device available for use.

#### **8. SCSI device attaches to any PC 99-compliant SCSI controller**

##### *Required*

All SCSI scanners must be able to attach successfully to any SCSI controller that meets the PC 99 requirements defined in the “SCSI” chapter in Part 3 of this guide.

#### **9. USB device meets PC 99 USB requirements**

##### *Required*

All USB hardware must comply with the requirements defined in the “USB” chapter in Part 3 of this guide, which includes the USB specifications for specific device types. This ensures complete Plug and Play capabilities with USB hardware and meets all the core and device requirements for USB. For example, a user must be able to dynamically attach any USB peripheral to any USB connector. The operating system should automatically recognize the device, load and initialize the appropriate drivers, and then make the device available for use.

All devices must comply with the requirements defined in the *USB Imaging Class Specification*, and drivers must be implemented under the WDM Still Image architecture, as defined in the Windows NT 5.0 DDK.

#### **10. USB device supports string descriptors**

##### *Required*

The device descriptor, as listed in Section 9.6.1 of the USB specification, must have valid iManufacturer and iProduct string descriptor indexes. All USB scanners must comply with requirements defined in Sections 9.4.3 and 9.6.5 of the USB specification.

**11. USB imaging device has a zero-bandwidth interface***Recommended*

Imaging devices should not pre-allocate bandwidth based on intended use. This results in limited bandwidth for other USB devices. USB bandwidth requests must be based on usage demand at the time of demand.

The USB device should have a zero-bandwidth interface and other incremental interfaces (for example, the imaging device driver should be capable of requesting subsequently smaller bandwidth quantities). This is to ensure that the imaging device can deliver data to the system when optimal bandwidth is not available. In the future, standards bodies might enforce a stricter bandwidth limitation to specific device classes.

**12. USB device does not saturate the USB bus***Recommended*

With an increasing number of USB peripherals in the PC environment, saturation of the USB bus is occurring on a more frequent basis, specifically due to the integration of high-bandwidth devices such as digital still cameras, scanners, and video cameras.

It is recommended that no imaging device use more than 8 Mb/s of available bandwidth to ensure the continued operation of low bandwidth devices such as USB mice and keyboards. In the future, standards bodies might enforce a stricter bandwidth limitation to specific device classes.

**13. USB device follows PC 99 USB performance recommendations***Required*

All USB devices must comply with the performance requirements listed in the USB chapter in Part 3 of this guide.

**14. Digital camera uses PC-compatible file system for removable storage***Required*

For devices that include removable flash memory, a file system that is PC-compatible must be provided. The Flash Translation Layer (FTL) specification is an example of such a file system.

**15. Digital camera stores images in common file formats such as JPEG or FlashPix***Recommended*

Enhancing the user experience is essential for the ubiquitous use of digital images. Increasing satisfaction can be accomplished by standardizing on the file format used to store the image inside the camera, providing interoperability between devices and software. JPEG, TIFF, BMP, GIF, and PNG file filters are incorporated in a great number of image and productivity software, providing comprehensive imaging support so that images can be shared.

Reducing the time required to transmit and process images will also further the use of digital images. The FlashPix (FPX) file format provides a rich experience with digital images, offering multiple resolution levels and allowing local region edits, improving the user experience. In the future, the FPX file format is expected to be universal, especially in Internet-related imaging.

#### **16. IEEE 1394 device meets PC 99 requirements for IEEE 1394**

*Required*

All IEEE 1394 hardware must comply with the requirements defined in the “IEEE 1394” chapter in Part 3 of this guide.

## PC 99 Design for Scanners and Digital Cameras

This section summarizes requirements related to the PC 99 design initiatives described in Part 1 of this guide.

## Plug and Play for Scanners and Digital Cameras

The items in this section are requirements for Plug and Play capabilities. For Plug and Play requirements related to parallel ports, see the “I/O Ports and Devices” chapter in Part 4 of this guide or the related bus port requirements in Part 3 of this guide.

#### **17. Serial device complies with Plug and Play External COM Device Specification v. 1.0**

*Required*

To improve the installation process, imaging devices with a serial port interface must provide full Plug and Play support for the PC using serial enumeration. Serial enumeration provides a mechanism to support automatic configuration capability for peripheral devices that connect to a PC using Asynchronous Serial Data Interchange on standard serial ports, commonly known as COM ports.

For information, see the *Plug and Play External COM Device Specification, Version 1.0* (available from the Plug and Play specifications at <http://www.microsoft.com/hwdev/respec/>).

#### **18. Plug and Play capabilities implemented for all supported buses**

*Required*

Complete Plug and Play capabilities must be implemented for all buses that the device supports. For information about the Plug and Play requirements, see the related bus requirements in Part 3 of this guide.

#### **19. Each device has a Plug and Play device ID**

*Required*

All devices for all buses must supply a human-readable device ID in the manner required for the bus it uses. The device ID requirements for each bus type are

defined in Part 3 of this guide; however, the device ID requirements for devices that use parallel ports are defined in the IEEE 1284 specification, as summarized in the “I/O Ports and Devices” chapter in Part 4 of this guide.

## Scanner and Digital Camera Power Management

This section summarizes the specific power management requirements for scanners and digital cameras.

### **20. Device supports power management requirements for its bus**

*Required*

The device must support the power management requirements for the bus it uses, as defined in Part 3 of this guide.

## Device Drivers and Installation for Scanners and Digital Cameras

This section summarizes the device driver requirements for scanners and digital cameras.

### **21. Device drivers and installation meet PC 99 requirements**

*Required*

The manufacturer does not need to supply a driver if a PC 99-compliant driver provided with the operating system can be used. If the manufacturer supplies a driver, the requirements for the device drivers and installation are defined in the “PC 99 Basic Requirements” chapter in Part 2 of this guide. The basic requirements include driver support for unattended installation and Help file support if special driver parameters are used.

### **22. Driver support is implemented under Still Image architecture**

*Required*

Still image devices must provide drivers based on the Still Image architecture (STI 1.0 or later). The services provided by STI provide hardware abstraction, installation wizards, and event polling.

**Note:** The IR bus interface is exempt from this requirement.

Still digital cameras capable of creating video streams also must provide a WDM minidriver based on WDM Stream class support.

For information about the Still Image architecture and WDM Stream Class support, see the Windows 98 DDK and the Windows NT 5.0 DDK. See also the related articles on the web site at <http://www.microsoft.com/hwdev/desinit/>.

**23. Applications provided with the device meet Win32 specifications***Required*

Any Windows-based applications provided with the device must meet Microsoft requirements for software compatibility as defined in the Microsoft Platform SDK.

**24. Device driver supports TWAIN 1.7 or later***Required*

For those devices that ship a TWAIN datasource, the device must support TWAIN 1.7 or later to ensure it can run without a hardware-specific user interface and can download  $n$  number of images at a single time.

**Note:** Fingerprint scanners are excluded from this requirement.

**25. Digital camera with an IR interface use the Windows Sockets interface***Required*

Windows NT 5.0 does not provide support for IrComm-based devices. For imaging devices that include an IR interface, an IR driver must be provided that is based on the Windows Sockets interface.

**26. Asynchronous imaging device with an IEEE 1394 interface uses****SBP2Port***Recommended*

SBP2Port is the IEEE 1394 SPB2 protocol/transport driver and provides transport services for SCSI commands over IEEE 1394. It is recommended that asynchronous imaging devices use SBP2Port to communicate over IEEE 1394 if converting the device from a SCSI interface.



## Scanner and Digital Camera References

The following represents some of the references, services, and tools available to help build hardware that is optimized to work with Windows operating systems.

Device class power management reference specifications

<http://www.microsoft.com/hwdev/onnnow.htm>

International Color Consortium (ICC)

ICC Profile Format Specification

<http://www.color.org>

Plug and Play specifications

<http://www.microsoft.com/hwdev/respec/>

*Universal Serial Bus Specification, Version 1.0*

*USB Imaging Class Specification*

Phone: (503) 264-0590

Fax: (503) 693-7975

<http://www.usb.org>

WDM device driver support and WDM Still Image architecture white papers

<http://www.microsoft.com/hwdev/desinit/>

Windows and Windows NT 5.0 DDKs and Microsoft Platform SDK

MSDN Professional membership

## Checklist for Scanners and Digital Cameras

If a recommended feature is implemented, it must meet the PC 99 requirements for that feature as defined in this document.

1. Device uses PC 99 compatible port connection  
*Required*
2. Icons provided for port and peripheral connectors  
*Required*
3. Device supports ICC color matching  
*Required*
4. IR device meets PC 99 IR requirements  
*Required*
5. Digital camera with an IR interface uses Fast IR  
*Required*
6. Digital camera with an IR interface provides a secondary PC interface  
*Required*
7. SCSI device meets PC 99 SCSI requirements  
*Required*
8. SCSI device attaches to any PC 99-compliant SCSI controller  
*Required*
9. USB device meets PC 99 USB requirements  
*Required*

- 10. USB device supports string descriptors  
*Required*
- 11. USB imaging device has a zero-bandwidth interface  
*Recommended*
- 12. USB device does not saturate the USB bus  
*Recommended*
- 13. USB device follows PC 99 USB performance recommendations  
*Required*
- 14. Digital camera uses PC-compatible file system for removable storage  
*Required*
- 15. Digital camera stores images in common file formats such as JPEG or FlashPix  
*Recommended*
- 16. IEEE 1394 device meets PC 99 requirements for IEEE 1394  
*Required*
- 17. Serial device complies with Plug and Play External COM Device Specification v. 1.0  
*Required*
- 18. Plug and Play capabilities implemented for all supported buses  
*Required*
- 19. Each device has a Plug and Play device ID  
*Required*
- 20. Device supports power management requirements for its bus  
*Required*
- 21. Device drivers and installation meet PC 99 requirements  
*Required*
- 22. Driver support is implemented under Still Image architecture  
*Required*
- 23. Applications provided with the device meet Win32 specifications  
*Required*
- 24. Device driver supports TWAIN 1.7 or later  
*Required*
- 25. Digital camera with an IR interface use the Windows Sockets interface  
*Required*
- 26. Asynchronous imaging device with an IEEE 1394 interface uses SBP2Port  
*Recommended*